

Some Observations on the Metamorphosis of the Frog *Rana curtipes* Jerdon

LUCY LOBO

*Biological Laboratory, Fordham University,
New York 58, N. Y.*

(Plate I; Text-figure 1)

RANA CURTIPES Jerdon is relatively unknown scientifically, but is found in abundance in the thick forests of Dandeli, Londa, Castlerock, Supa, Nagargali, Anmode and other neighboring forest areas along the Kali River on the west coast of India. Tadpoles in various stages of development are often seen swarming together in the Kali River (Kali = black), where their jet black color blends with the black waters of the river.

The frog is often found in small puddles within the forest and seems to prefer the cool water of shady areas. It apparently estivates during the hot season extending from March to May, when all the pools and puddles dry up. In the rainy season (*i.e.*, from June to September) it is seen in large numbers.

Tadpoles collected from various forest areas along the Kali were brought to the Karnataka College laboratory at Dharwar, India, where they were allowed to metamorphose in an aquarium well supplied with algae and other food material.

It was not possible to undertake a detailed study of the development from fertilization of the egg to the emergence of the tadpoles, since the spawn could not be found; neither could early tadpole stages with external gills be collected. Only young tadpoles (Plate I, Fig. 1), jet black in color, are seen swimming in the Kali River in the months of September and October. A young tadpole measures about 2 inches in length. It has a long and coiled gut about 8 inches long. These tadpoles are voracious and are purely vegetarian in diet.

Growth takes place by an increase in size of the tadpole and by a relative elongation of the gut. No other morphological changes take place.

The large tadpole (Plate I, Fig. 2) varies in length from 3 to 4 inches. It is very stout and its sluggish nature may be attributed to its feeding habits.

Large tadpoles are blackish-brown with a large head, and a distinct parotoid-like gland is found behind each eye. Posteriorly the long tail is flattened like a fin. The mouth is wide and bears two horny lips and 4 to 6 rows of labial teeth over the dorsal lip (Text-fig. 1). A row of papillae surrounds the mouth parts. Scattered irregularly along the body and tail are black dots, which are less prominent on the head region.

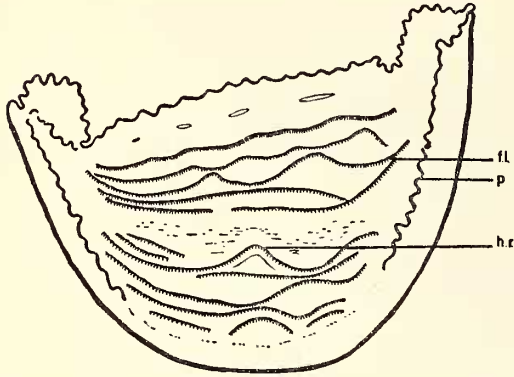
The following table shows the approximate growth of a tadpole from October to January.

Month	Length of Body	Breadth of Body	Length of Intestine	Remarks
October	2"	1"	8"	Small tadpoles
November	3"	1"	14½"	Large tadpoles
December	4"	1½"	15"	" "
January	4½"	1½"	14"	" "

No structural modifications occur in the tadpole during these four months, but only an increase in size. The tadpole attains its maximum growth about the middle of January, after which it becomes even less active. About the end of January the hind limbs make their appearance. At this stage the tadpole has a very long tail (2-3") and the head is about 1 inch long (Plate I, Fig. 3). The gut now shows a reduction in length and measures 14 inches.

About the first week of February the fore limbs begin to bud and early in March the hind and fore limbs are fully formed. The tadpole is

still jet black and has a long tail, as seen in Plate I, Fig. 4. The tail is gradually absorbed and a reduction in size of the gut ensues. By the end of March the last traces of the tail have disappeared and metamorphosis is complete.



TEXT-FIG. 1. Mouth parts of tadpole of *R. curtipes*.

The young frog (Plate I, Figs. 5 & 6) has now changed its diet and feeds on insects. The young frog is jet black but it gradually loses the black pigment on the dorsal and ventral surfaces, which take on a brown color as age advances.

The prolonged growth and metamorphosis in the forest-dwelling *Rana curtipes* is peculiar to its kind, and extends over a total period of 9 months, usually from July to March.

ACKNOWLEDGEMENTS

I wish to express by appreciation to Dr. J. C. Uttangi, Dept. of Biology, Karnatak Science College, Dharwar, India, for help and facilities

rendered to me in making my observations. Thanks are also due to Dr. R. S. Miller, Dept. of Biology, University of Saskatchewan, Saskatoon, Sask., Canada, for the necessary corrections made in the manuscript.

BIBLIOGRAPHY

BLAIR, W. F. & A. P. BLAIR

1957. Vertebrates of the United States. McGraw-Hill, New York.

BOULENGER, G. A.

1890. Fauna of British India. (Reptilia and Batrachia). Taylor and Francis, London.

1903. Description of three new frogs from Southern India and Ceylon. Journ. Bombay Nat. Hist. Society, XV:430-431.

BUTLER, A. L.

1903. A list of Batrachians known to inhabit the Malay Peninsula, with some remarks on their habits and distribution. Journ. Bombay Nat. Hist. Society, XV: 193-205, 387-402.

FERGUSON, H. S.

1904. A list of Travancore batrachians. Journ. Bombay Nat. Hist. Society, XV: 499-509.

HOLMES, S. J.

1926. The Biology of the Frog. The Macmillan Company, New York.

NOBLE, G. K.

1931. The Biology of the Amphibia. McGraw-Hill, New York.

RUGH, R.

1951. The Frog. Reproduction and Development. The Blakiston Company, Philadelphia.

EXPLANATION OF THE PLATE

PLATE I

- FIG. 1. Small tadpole of *R. curtipes*.
- FIG. 2. Large tadpole of *R. curtipes*.
- FIG. 3. Tadpole with hind limbs.
- FIG. 4. Tadpole with fore and hind limbs.
- FIG. 5. Young frog with tail.
- FIG. 6. Young frog with reduced tail.